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PROSPECTIVE SCIENCE TEACHERS' INFORMATION LITERACY AND SCIENTIFIC ARGUMENTATION SKILLS IN ONLINE LEARNING DURING COVID-19 PANDEMIC

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ABSTRACT

This study aims to analyze prospective science teachers' information literacy and scientific argumentation skills and their correlations in online learning during the COVID-19 pandemic. This survey research with a cross-sectional design involved 342 students from a state university in Surabaya. The survey was given online to all respondents with a response rate of 77%, consisting of 23 men and 241 women. The information literacy skill instrument was adapted from the eight indicators of the empowering eight model and declared valid. Indicators include the ability to identify, explore, select, organize, create, present, access input, and use information. The argumentation skills instrument consists of four indicators: the ability to identify claims and their qualifications, identify types of data and their quality, identify reasons and quality, and identify objections and counter-arguments. In contrast to the results of previous studies in this study, prospective teachers' information literacy obtains an average of 83% in a good category. Based on the correct answers to the four indicators, the argumentation skills used obtained an average score of more than 50% on the less and very poor criteria. Based on the SPSS one-tailed correlation test, a correlation coefficient of 0.103 is obtained with very low criteria. This study concludes that students' information literacy skills are in line with their argumentation skills but in very little correlation.

Keywords: argumentation; capability learning; literacy; self-directed learning

INTRODUCTION

Information literacy skills are learning tools that individuals, such as educators and students, must possess (Davis et al., 2019; Tomczyk, 2020) to understand, find, evaluate, and use information. These skills are critical, especially in the era of technology that is developing continuously and has become crucial (Durodolu, 2016). Mastering these skills makes one understand information and use it comprehensively (Bapte, 2019). Information literacy is the only solution to reduce the digital divide between information-rich and information-poor people (Nisha & Varghese, 2021). While information literacy is known as essential for individuals, information literacy is also significant to students' success in the current society (Fosnacht, 2017; Wu et al, 2020). In filtering abundant information about the Covid-19 pandemic, for example, students require this skill to curtail fake news about too much information in circulation concerning COVID-19 (Igbinovia et al, 2020) and against science-related misinformation about (Gu & Feng, 2022). Regarding the latter concern, students need to have sufficient information literacy to interpret correctly virus characterization, treatment, and vaccine, and the knowledge communication resulting from the scientific literature characterization itself during the COVID-19 pandemic (Maia et al, 2021).

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In the context of science learning, information literacy prepares students, including prospective teachers, who aspire to become scientific educators to process the information acquired, organize it to obtain, and store it as new knowledge (Lapitan et al., 2021). Prospective teachers are not only required to become proficient in information literacy skills for their success but also, they need to learn how to teach their future students to become literate in any information (Kovalik et al, 2011; Botturi & Beretta, 2022). This is because this skill is essential for students to search for information independently to build rational statements from reliable information (Höttecke & Allchin, 2020). Also, this skill makes students the center of their learning (student-centered learning). It means students practice thinking skills and develop analytical skills (Hakim et al., 2020), be responsible for their learning or long-life learning (Bolek et al., 2018), master problem-solving skills, think in terms of dynamic and adaptive models (Ntuli & Kyei-Blankson, 2016), to withstand the complexities of online learning (Mishra et al., 2020) and face the 21st century in the era of disruption. Strong skills to seek, evaluate, and use information effectively and argumentation skills produce coherent scientific arguments in searching for alternative solutions to solve problems (Belland et al., 2020; Kim et al., 2022a).

The ability to produce coherent scientific arguments in making alternative solutions to our problems is a must. Scientific argumentation skills are the second important component in developing the ability to analyze and evaluate (The National Academies Press, 2012). Scientific argumentation trains critical thinking skills by making students understand problems (Giri & Paily, 2020) and carry out learning tasks and professional activities (Noroozi et al., 2020). Scientific argumentation skills are essential in science learning (Fakhriyah & Masfuah, 2021) to develop critical thinking and reasoning skills (Nussbaum, 2021). At the end of this decade, scientific argumentation has become an integral part of science education in schools (Frey et al., 2015). "Learning to argue" and "arguing to learn" are integral methods of using argumentation in learning (Mirza & Perret-clermont, 2009). Learning "arguing to learn" helps students, teachers, and researchers design a learning environment that facilitates argumentation, especially collaborative argumentation (Andriessen & Baker, 2014). Arguing for concept mastery is essential in determining students' learning success at school and the next level of education (Frey et al., 2015). Science learning focuses on improving students' scientific argumentation skills, especially related to scientific issues with constructivist learning (Giri & Paily, 2020), because argumentation skills are the best way to create scientific controversy (Garrecht et al., 2021) .

Creating scientific controversies is common among scientists because they can examine each other's ideas and look for flaws (Sharon & Baram-Tsabari, 2020). After all, the development of ideas is a process of criticism and argumentation. As scientists, students must be able to build the quality of their arguments with the support of their information literacy skills in finding alternative solutions to problems (Belland & Kim, 2021). The ability to evaluate information content, including the credibility of sources in terms of authority and validity, is crucial (Vamanu & Zak, 2022). Reference from vital and valid information can minimize uncertainty in decision-making (Singh & Grizzle, 2021), both for academic purposes and everyday life (Erduran, 2020). Solid arguments must support a good decision. It means that information literacy and argumentation skills cannot be separated (Radcliff, 2014), including the support of computer scaffolding (Kim et al., 2022b). It conveys instructional guidance in using online technology in the form of regulation on the use of online scaffolds (online regulation scaffolds) so that students can use it to learn correctly to improve learning outcomes (Alemdag & Yildirim, 2022). Information and digital technology-assisted interventions are necessary because they are effective for successful learning by providing challenges to students with opportunities for independent learning (Zhang & Zhou, 2023). Therefore, facilitating teachers' learning needs is needed as scaffolding (Vogel et al., 2022) for students through the learning process (Lase, 2019)

Scaffolding through the learning process is important because using digital devices for learning tools in accessing, evaluating, and using information validity of online learning resources is still a challenge for students (Barrot et al., 2021). In particular, the skills to analyze and evaluate information sources are proven inadequate (Marttunen et al., 2021). In addition, students also experience difficulties in understanding argumentation, especially the role of warrants in scientific argumentation (Martín-Gámez & Erduran, 2018). One's argumentation skill is also influenced by his concern for the truth of the current threat information (Lebid et al., 2021). Students' ability to assess the credibility of sources and recognize the arguments used by sources is still inadequate, so it is necessary to emphasize assignments that involve interpreting and analy-

zing online information. This ability enrichment needs to be done for a more focused claim-warrant transformation (Viyanti et al., 2020). Students must be able to compile strong evidence warrants to make claims about a problem or issue they face, so facilitating the practice of argumentation in learning is needed to improve it (Yilmaz et al., 2017). Improving students' ability to assess the credibility of sources and recognizing arguments from reference sources that involve interpretation and analysis of online information is crucial because it is an information processing stage (Marttunen et al., 2021).

Information processing is continuously influenced by new technological developments that cause the information society to change rapidly (De Meulemeester et al., 2019). Learning resources that are wide open on digital platforms have changed the educational landscape and have become a trend in searching for references to scientific literature (Mishra et al., 2022). The COVID-19 pandemic accelerated this change through online learning and optimizing learning resources on digital platforms (Tejedor et al., 2020; Chiu, 2021). Online learning has many advantages over conventional learning (Cummings et al., 2015; Lapitan et al., 2021). Online technology in teaching and learning can broadly optimize and increase access to learning materials (Davis et al., 2019). The ability to search, select, evaluate, and use the information correctly is essential, especially with the variety of information and documents available (Wertz et al., 2013; Douglas et al., 2020). Learning using resources from digital platforms also provides opportunities for students to build self-directed learning (Priyono et al., 2020; Zhu et al., 2020) and strengthens their information literacy skills (Douglas et al., 2020). The change in the learning paradigm is very different from before during the pandemic, where technology determines the quality of learning, so the approach framework in learning also needs to be considered (Han & Geng, 2023). This condition led the researchers to analyze the impact of changes on students' information literacy skills and argumentation skills.

Research related to the analysis of information literacy skills (Barrot et al., 2021; Marttunen et al., 2021) and argumentation skills (Suryani et al., 2020; Tenriawaru et al., 2021) has been carried out a lot, but they are still separated. The change in the learning paradigm during the pandemic will undoubtedly impact these two skills. Research on the influence of scaffolding on information literacy and argumentation skills in problem-based learning shows that information literacy and argumentation skills have a strong relationship. This means that the increase in argumentation skills is in line with the increase in students' information literacy skills (Kim et al., 2022a). Based on a literature review, more vital information literacy skills will train someone to make a coherent argument, so these two skills cannot be separated (Radcliff, 2014; Kim et al., 2022b).

This study aims to analyze prospective science teachers' information literacy and argumentation skills from different years of prospective science teachers after online-based learning during the COVID-19 pandemic. The researchers also intend to analyze whether there is a harmony between students' information literacy skills and their argumentation skills.

METHODS

This research was quantitative (Creswell, 2014b) with a cross-sectional survey design (Creswell, 2014a). This study aims to determine prospective science teachers' information literacy and argumentation skills in science education study programs at a state university in Indonesia. The target respondents in this study were 342 science education students from the first to the fourth-year class who took the digital literacy course. The number of respondents who completed and returned the questionnaire was 264 students, consisting of 241 women and 23 men, with a response rate of 77%. Respondents were divided into four batches: the first, second, third, and fourth years. Respondents were 43 people in the first year, 82 in the second year, 73 in the third year, and 66 in the fourth year.

The information literacy instrument was developed based on the information literacy indicators of the empowering eight model (Wijetunge & Singh, 2021) with eight indicators distributed in twenty questions. The indicators used include several skills: X1) identifying information, X2) exploring, X3) selecting, X4) organizing, X5) writing from the information obtained, X6) presenting or communicating, X7) accessing input, X8) using input for improvement (Wijetunge & Singh, 2021). The instrument consists of 20 multiple-choice questions using a 1-5 Linkert scale, but a scale of 3 was excluded (Chyung et al., 2017). The developed instrument was validated with the Aiken validation test and obtained an Aiken V score of 0.931, with a very valid category (Lewis, 1985; Retnawati, 2016). Instruments were given to participants online to make it easier and to get a greater response rate (Cohen et al., 2018).

Information literacy skills data from all respondents were analyzed descriptively (Leavy, 2017) to be interpreted and described on average for each indicator, the indicator with the lowest and highest average, and the frequency distribution of the answers. The average of each indicator was categorized into less, sufficient, good, and very good, according to the scores. Analysis was also carried out for each indicator in each year, and the data distribution was seen based on the error bar so that we can get a profile of the information literacy skills of the total respondents.

The scientific argumentation skill instrument was adapted from Frey (2015) and declared valid and reliable. Adaptations were made to language transfer, and the number of questions asked while accessing indicators of argumentation skills. This scientific argumentation skill instrument consists of 15 multiple-choice questions which include four indicators: Y1) identify claims and qualifiers of claims, Y2) identify types of data and their quality, Y3) identify reasons and qualities, Y4) show rebuttal and counter-arguments (Frey et al., 2015). The test result data were obtained using a survey. Hopefully, students' scientific argumentation skills will increase by using their opinions and personal experiences (Watson et al., 2018). Instruments were given to participants online. The data were analyzed by descriptive quantitative analysis. Data on scientific argumentation skills were also analyzed descriptively to see the average correct answers for each indicator from all respondents, the highest and lowest averages, the frequency distribution of the answers, and the distribution of the answers using box plot diagrams. The average of each indicator was then categorized as very less, less, needs to be improved, and good. The most important thing is knowing the profile of the argumentation skills of the total respondents. Data on literacy and argumentation skills results were then analyzed by conducting a one-party correlation test to determine their relationship. Score data One-sided correlation test, described to see whether the increase in student information literacy skills is equivalent to an increase in argumentation skills.

RESULTS AND DISCUSSION

A survey with this cross-sectional design was conducted to determine prospective science teachers' information literacy and argumentation skills simultaneously in four years. The detailed profile of the recapitulation of students' information literacy questionnaire is shown in detail in Table 1.

Table 1. The Average Scores of Information Literacy Skills

Indicator	X1	X2	X3	X4	X5	X6	X7	X8
	(Identify)	(Explore)	(Select)	(Organize)	(Create)	(Communicate)	(Access)	(Use)
Mean	4.41	3.87	4.19	3.40	4.37	3.95	4.55	4.44
Standard Error	0.04	0.03	0.04	0.05	0.04	0.04	0.03	0.03
Median	4.45	4.00	4.00	3.30	4.00	4.00	5.00	5.00
Mode	5.00	4.00	4.00	3.30	4.00	4.00	5.00	5.00
Standard Deviation	0.61	0.56	0.59	0.60	0.80	0.80	0.50	0.50

Table 1 shows the mean or average of each indicator of information literacy skills, with the lowest score of 1 and the highest of 5. Organizing (X4) obtained the lowest average of 3.40 with a standard deviation of standard errors (SE) of 0.05. In comparison, accessing input (X7) obtained the highest average, with an average of 4.55 and SE of 0.03. The standard error of 0.05 was the highest, and 0.03 was the lowest. Since the standard error is minimal compared to the mean, the distribution of the sample mean is insignificant, or the sample mean can be estimated or has accuracy concerning the overall sample mean.

Based on the standard deviation of the accessing input (X7) indicator, a score of 0.50 means that the answers from the respondents have a low level of variation in the range of data. A complete description of the frequency distribution of respondents' answers from this indicator is in Table 2.

Table 2. The Total Frequency of Answers to the X7 (Access) Indicator

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
6	8	3.0	3.0	3.0
7	2	0.8	0.8	3.8
8	64	24.2	24.2	28.0
9	69	26.1	26.1	54.2
10	121	45.8	45.8	100.0
Total	264	100.0	100.0	

As shown in Table 2, the X7 indicator obtained five frequencies in respondents' answers, with the lowest total score of 8 (six respondents) and the highest total score of 10 (121 respondents). On the other hand, the organizing indicator (X4) scored 0.60. A complete description of the frequency distribution of respondents' answers from this indicator is in Table 3.

Table 3. The Total Frequency of Answers to the X4 (Organize) Indicator

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
7	1	0.4	0.4	0.4
8	3	1.1	1.1	1.5
9	1	0.4	0.4	1.9
10	40	15.2	15.2	17.0
11	23	8.7	8.7	25.8
12	62	23.5	23.5	49.2
13	36	13.6	13.6	62.9
14	58	22.0	22.0	84.8
15	40	15.2	15.2	100.0
Total	264	100.0	100.0	

Table 3 shows the total frequency of respondents' answers on the X4 indicator. There were nine frequencies, with the lowest score of 7 (one respondent) and the highest score of 15 (40 respondents). Based on these descriptions, the total variance of respondents' answers on the X7 indicator was much less than on the X4 indicator.

The results of the Linkert scale analysis on the average of each indicator are grouped into four categories, as shown in Figure 1.

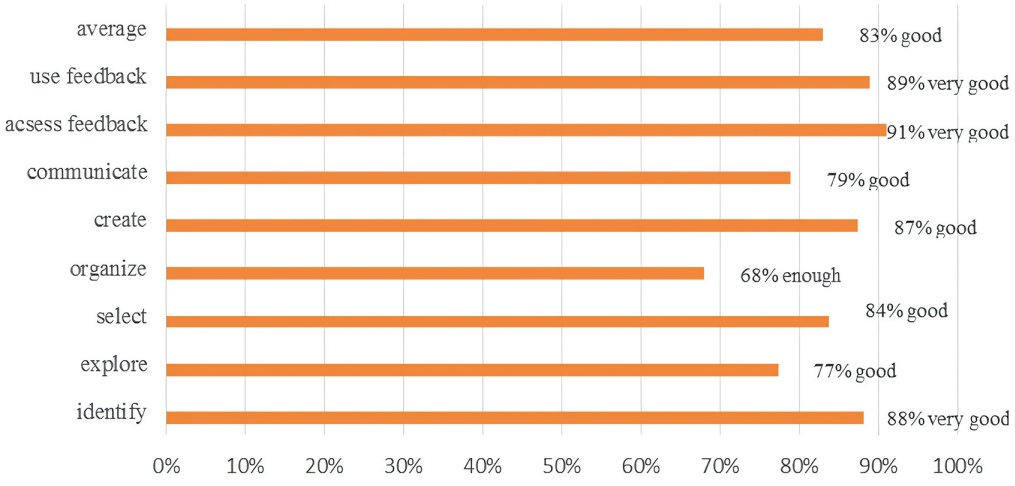

Figure 1. Percentage of the Total Linkert Scale Score of Each Indicator

Based on Figure 1, the results show three indicators in the very good category, four in the good category, and one in the sufficient category. The average of all indicators of information literacy skills is good. These information literacy skills can still be improved by implementing collaborative learning with group assignments to encourage students to share skills and manage time well (Ishimura & Fitzgibbons, 2022). However, even though it is good, giving group assignments also has areas for improvement in the negligence of students when combining various information from all group members in the broad framework of their knowledge (Arave & Stonebraker, 2023). The ability to build a knowledge framework from information/knowledge assembly requires the ability to organize good information. Figure 1 shows that it is the lowest indicator of information literacy skills.

In addition to the average for each indicator of student information literacy skills for all respondents, The average for each class was also analyzed. A complete description of this data can be seen in the bar chart shown in Figure 2.

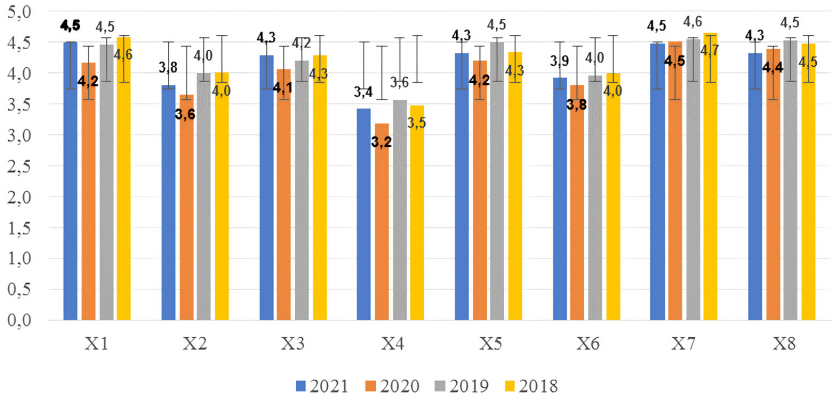

Figure 2. The Average Indicator of Information Literacy Indicator in Four Batches

Based on Figure 2., the highest average score for all classes is the indicator of accessing input (X7). The highest score (4.7) was obtained by the class of 2018, and the lowest score (4.3) was obtained by the class of 2021. The indicator of organizing information (X4) got the lowest average score for all classes. The class of 2020 obtained the lowest score (3.2), and the class of 2019 obtained the highest score (3.6). The error bar data in Figure 4 also shows that the longest standard error is the organizing information (X4) which was 0.05 with a mean of 3.40. The range of variation in the mean and the overall sample mean was the largest compared to the other indicators. The profile of students' argumentation skills was obtained using an argumentation skill test consisting of fifteen questions with four indicators. Indicator (Y1) consisted of three questions, (Y2) had six questions, (Y3) had three questions, And (Y4) had three questions. Descriptive analysis data on the results of the argumentation skills test from all respondents were mapped based on the number of correct answers for each indicator, as shown in Table 4.

Table 4. Descriptive Analysis Data for Each Indicator of Argumentation Skills

Indicator	Y1 (Identify the claim and claim qualifier)	Y2 (Identify the type of data and its quality)	Y3 (Identify the reason and quality)	Y4 (Show rebuttal and counter-argument)
Mean	0.37	0.60	0.44	0.48
Median	0.33	0.67	0.33	0.33
Mode	0.00	0.67	0.33	0.67
Standard Deviation	0.40	0.20	0.24	0.26

Based on the average total indicators shown in Table 4, the Y1 indicator, identifying claims and their qualifiers, obtained the lowest mean of 0.372 with a standard deviation of 0.40. The standard deviation was more significant than the mean, indicating that the mean obtained cannot be estimated at the mean of all respondents. The details were in the frequency distribution of

the answers to Y1 questions, as shown in Table 5. Based on Table 5, from 264 respondents, 122 (46.2%) scored 0, 46 respondents scored 1, 39 scored 2, and 57 answered all three questions correctly. Claim in scientific arguments requires a strong warrant. unlike the type of critical thinking text, which is generally hyperbole in its arguments to gain more support for the claim made (Kreider, 2022). Therefore, the resulting claim is inaccurate.

Table 5. Frequency Distribution of Total Answers in the Y1 (Identify the claim and claim qualifier) Indicator

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	122	46.2	46.2	46.2
	1	46	17.4	17.4	63.6
	2	39	14.8	14.8	78.4
	3	57	21.6	21.6	100.0
	Total	264	100.0	100.0	

The Y2 indicator, identifying the type of data and its quality, got the highest mean of correct answers with a score of 0.60 and the lowest standard deviation of 0.2. The frequency distribution of data Y2 data is shown in Table 4. Based on Table 4, six variants of the answer score were obtained, with the lowest score (0) for three respondents and the highest score (6) for five respondents. The distribution of correct answer data from respondents for the Y2 indicator varied, with seven kinds ranging from zero to six.

Table 6. Frequency Distribution of Total Answers in the Y2 (Identify the type of data and its quality) Indicator

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	3	1.1	1.1	1.1
	1	10	3.8	3.8	4.9
	2	32	12.1	12.1	17.0
	3	72	27.3	27.3	44.3
	4	76	28.8	28.8	73.1
	5	66	25.0	25.0	98.1
	6	5	1.9	1.9	100.0
	Total	264	100.0	100.0	

The data analysis of students' scientific argumentation skills found that the ability to identify claims and qualifiers of claims was the lowest compared to the other indicators. In comparison, the ability to identify data types and their quality was the highest. Students' argumentation skills were grouped by category based on the total score range of correct answers. Criteria for students' scientific argumentation skills were divided into four categories: very less, Less, needs to be improved, and good. The criteria for the argumentation skills of all respondents are shown in Figure 3.

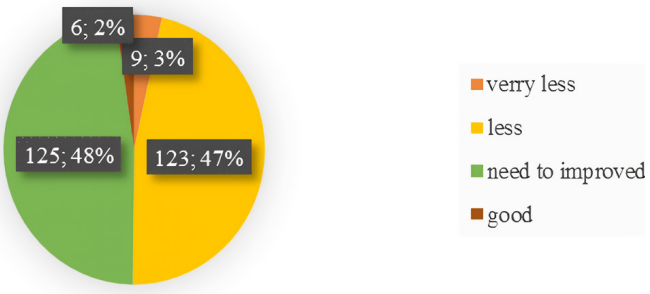

Figure 3. Criteria for Scientific Argumentation Skills for All Respondents

Based on Figure 3, the number of respondents with "very less" scientific argumentation skills was 3 % (9 respondents) and only 2 % (9 respondents) were good. The rest was in the less category of 47% (123 respondents) and 48% (125 respondents) in the "need to be improved" category. Based on the data, it can be interpreted that students' critical thinking skills are still low because higher-order thinking skills can be trained with argumentation (Giri & Paily, 2020).

The distribution for each indicator of scientific argumentation skills is shown in a boxplot diagram in Figure 4.

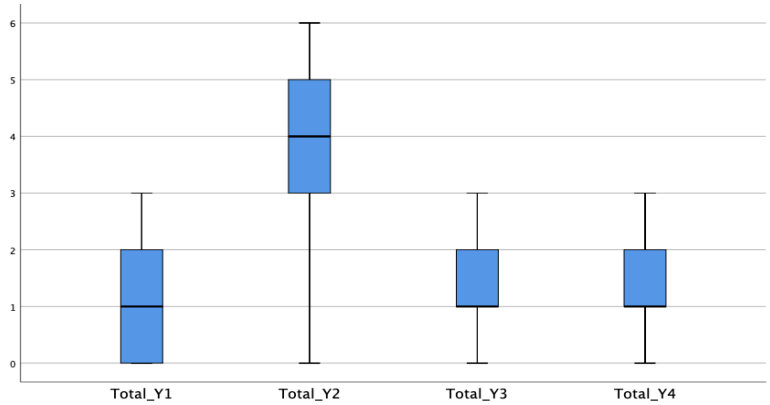

Figure 4. Boxplot the Distribution of Each Indicator of Argumentation Skills

The boxplot diagram shows that the Y1 and Y2 indicators' data distribution was relatively high compared to Y3 and Y4. Y1 indicator lower quartile or Q1 is at the lower whisker, showing that the average scientific argumentation skills for the Y1 indicator were at the lower limit of the minimum score that respondents obtain. It means that from the total score range of the Y1 indicator, which consists of three questions, with a minimum score of 0 and a maximum score of 3. The overall sample score distribution was more excellent at the lower limit or score of 0. Unlike the Y2 indicator, it is in Q2 and Q3, with a total score range of 3 to 5 and Q4 as the upper limit (0). It means that the total score on the Y2 indicator was above 50%.

Based on the analysis of scientific argumentation skills in each class, as shown in Figure 5.

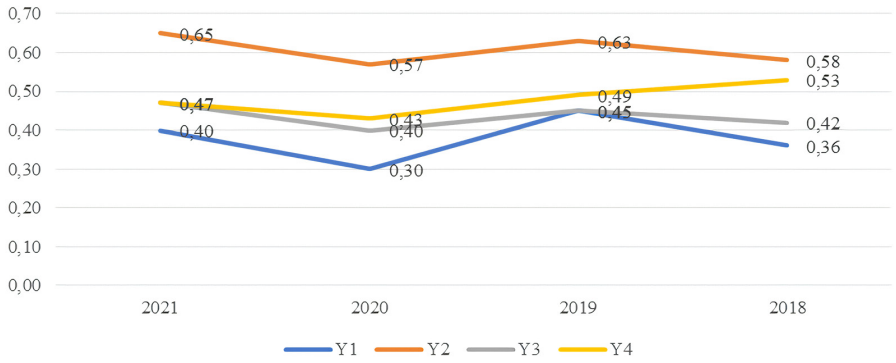

Figure 5. Mean Item of Scientific Argument for Each Indicator

The highest average was obtained by the Y2 indicator (identifying the type of data and its quality), and the 2021 class obtained the highest average score (0.65). The lowest average was the Y1 indicator (identifying claims and qualifiers), with the lowest average score obtained by the 2020 class. Based on Figure 5, all scientific argumentation indicators for the 2019 class received the highest average score compared to others. This result shows that the length of their studies does not determine students' scientific argumentation skills. The 2021 class received online learning since high school due to the pandemic, and the 2018 class received face-to-face learning in high schools; both obtained a lower average score than the 2019 class. The approach to practicing

conventional argumentation does not involve students in reflective and high-order thinking, relies only on textbooks in learning assignments, and does not involve students in collaborative work (Darmawansah et al., 2022). These become the factors that cause students' argumentation skills to be low, so it needs a practical approach to teaching scientific argumentation.

One's information literacy skills will strengtOne's information literacy skills will strengthen their argumentation skills, while argumentation skills are a strategy for developing metacognitive skills and strengthening information-seeking strategies (Reisoğlu et al., 2020). A one-sided correlation test was conducted to determine the relationship between students' information literacy and argumentation skills. Based on the results of the correlation test using SPSS, the results are shown in Table 7.

Table 7. SPSS Correlation Test Data for Information Literacy and Scientific Argumentation Skills

		Information literacy skills	Scientific Argumentation Skills
Information literacy skills	Pearson Correlation	1	.103
	Sig. (1-tailed)		0.047
	N	264	264
Scientific Argumentation Skills	Pearson Correlation	.103	1
	Sig. (1-tailed)	0.047	
	N	264	264

Table 7 shows that, from the correlation test results, a significance level of 0.047 was less than 0.05, indicating a relationship between information literacy skills and argumentation skills. The correlation coefficient score (r) was 0.103, meaning that the correlation coefficient was 0.01 - 0.20, showing a very low or weak relationship.

The Linkert scale analysis of the average score of students' information literacy skills obtained 83% in the good category. The X4 indicator, organizing information, got the lowest score, with an average of 68% in the sufficient category. The low X4 indicator occurred in all classes, with the lowest score by the second-year students. On the other hand, the highest was the X7 indicator, accessing input, with a percentage of 91% in the very good category. with the highest score by the third-year students. The other six indicators were in the good and very good categories. It means that students' ability to organize information needs to be improved. Skills for making logical sequences, distinguishing, evaluating the validity, and grouping information into opinions, facts, or fiction were included in the information in visual form (Wijetunge & Manatunge, 2014). Organizing information is a complex ability, so this becomes an obstacle for students.

The low average score for the ability to organize information is in line with previous research, where students' ability to find news is outstanding, but the ability to recognize and distinguish fake news from accurate news is still deficient (Igbinovia et al., 2020). Hence, students can access various news sources but need to increase their understanding (Fauzi et al., 2020). The ability to organize information requires critical thinking skills. The ability to organize information in advance (Moreno, 2010) and create a database of all information in several categories is essential to avoid misinformation (Allen et al., 2020). Good decision-making requires knowledge management and is greatly influenced by the processing of the information obtained. Good information organization (Santrock, 2011) is needed in decision-making (Rahman, 2019) because the quality of decisions is influenced by the information content they have (Gresch et al., 2017). An emphasis on learning that can train information-organizing skills needs to be done (Moreno, 2010), in general, especially in science learning. Practicing information literacy skills means training students to independently search for information, build their knowledge rationally, and produce knowledge beyond facts.

The analysis of students' argumentation skills shows that the indicator with the highest average is "identifying data and its quality", while the lowest is "identifying claims and their qualifiers". The results indicate that students cannot yet use, Analyze, read in-depth (Probosari et al., 2019), and make causal relationships from the information and data obtained to form claims. It can also be because they have a defensive argumentation style that tends to change claims. Similar research was conducted on 37 seventh-grade students. It was found that only a small sample

could make claims, while the other 78% could not (Rahayu & Widodo, 2019). Students must be trained to use data to support claims (Kahraman & Kaya, 2021).

Identifying claims and their qualifiers is the main indicator of argumentation skills. The reason is that claims are the main conclusion of an argument (Chrysi Rapanta, 2019) and require high-level thinking skills to identify (Viyanti et al., 2020). Determination of claims must also be followed by proof of data and reasons (Erduran & Kaya, 2016), rational activity (Andriessen & Baker, 2014), and the ability to use data appropriately through arguments (Acharya et al., 2022). Practicing argumentation in the learning and assessment process increases the ability to make quality claims supported by warrants in completing existing solutions (Viyanti et al., 2020).

Based on the discussion of the results of these two skills, students' information literacy skills differ from their argumentation skills. Regarding information literacy skills, which are categorized as good, it turns out that only 9.3% got a good category for argumentation skills. The rest are in the categories of very less, Less, and need to be improved. Supported by the results of the correlation analysis of these two skills, the correlation was very low. This result is in line with research that states that students with a high level of information literacy competency still have a low prevalence rate of fake news related to COVID-19 (Igbinovia et al., 2020). Regarding the importance of information literacy in science learning (Fauzi & Khusuma, 2020; Zulkarnain et al., 2020), researchers recommend the need for universities and the world of education to initiate an increase in information literacy skills, but because information literacy skills cannot be separated from argumentation skills, training both skills is a must.

CONCLUSION

This study shows that prospective teachers' information literacy obtains an average of 83% in a good category. Information literacy skills for each class vary. Of the eight existing indicators, accessing input (X7) is the indicator with the highest average score, while the lowest is organizing information (X4). It means the ability to organize information needs to be trained or improved. Based on the correct answers to the four indicators, the argumentation skills used obtained an average score of more than 50% on the less and very poor criteria, indicating that argumentation skills need improvement. Based on the correlation test, the r correlation score was 0.103, which means there is a relationship between students' information literacy skills and scientific argumentation skills, but the correlation is very low. There needs to be a learning method or model to train both skills simultaneously and reinforce each other. This study concludes that students' information literacy skills are in line with their argumentation skills but very little correlated. Students have not used their information literacy skills to support their argumentation skills.

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